Fetal heart rate monitoring in the antenatal and intrapartum period MATY022	
Type: Guideline	**HDSS Certification Standard** [optional]
Issued by: Hutt Valley Maternity PPG Group	**Version:** 2.2
Applicable to: Hutt Valley District only	**Contact person:** Midwifery Educator
Document Owner: CHOD O & G	**Senior Document Owner:** Director of Midwifery
Lead District: Hutt Valley	

Hutt Maternity Policies provide guidance for the midwives and medical staff working in Hutt Maternity Services. Please discuss policies relevant to your care with your Lead Maternity Carer.

Purpose:

To provide guidance for the use of intermittent auscultation and electronic fetal monitoring in the antenatal and intrapartum periods.

Scope:

For the purposes of this document, staff will refer to:

All staff within Te Whatu Ora – Health New Zealand Capital, Coast and Hutt Valley. This includes staff not working in direct contact with patients/consumers. Staff are taken to include anyone engaged in working to the Hutt Valley DHB. This may include but is not limited to:

- Employees irrespective of their length of service
- Agency workers
- Self-employed workers
- Volunteers
- Consultants
- Third party service providers, and any other individual or suppliers working in Hutt Maternity, including Lead Maternity Carers, personnel affiliated with third parties, contractors, temporary workers and volunteers
- Students

Definitions:

Abbreviations used in this document

- **BPM** Beats per minute
- **CTG** Cardiotocograph
- **CEFM** Continuous electronic fetal monitoring
- **EFM** Electronic fetal monitoring
- **FBS** Fetal blood sampling

- **FHR** Fetal heart rate
- **FSE** Fetal scalp electrode
- **LSCS** Lower segment caesarean section birth
- **LMC** Lead maternity carer
- **SIA** Structured intermittent auscultation

Fetal heart rate monitoring is a standard feature of both antenatal and intrapartum care, and may be performed by auscultation with a fetal stethoscope, pinard or hand-held Doppler or by continuous electronic fetal monitoring (CEFM) by cardiotocograph (CTG), in which a continuous electronic record of the fetal heart rate obtained via an ultrasound transducer placed on the woman/pregnant person's abdomen. Structured intermittent auscultation is defined as auscultation of the fetal heart, using a hand held Doppler, undertaken at regular intervals and for a pre-defined time during labour.

As per Section 88 of the New Zealand Public Health and Disability Act 2000 Access Agreement, all access holders are responsible for having appropriate clinical competencies to interpret the findings of fetal surveillance.[4]

Evidence

Routine use of intermittent auscultation in the **antenatal** period is standard rather than evidence-based practice. Auscultation of the fetal heart may confirm that the fetus is alive but is unlikely to have any predictive value (NICE, 2008). It may provide reassurance for the pregnant person and their whānau, but should be accompanied by a full assessment of maternal and fetal wellbeing.

There is no evidence to support the routine antenatal use of EFM for fetal assessment in pregnant people with an uncomplicated pregnancy (Grivell, Alfirevic, Gyte, & Devane, 2015). For people at increased risk of pregnancy complications current evidence has not identified differences in outcomes with the use of EFM during pregnancy, though more studies are needed (Grivell *et al*.).

Intrapartum fetal surveillance is used with the aim of preventing adverse perinatal outcomes arising from fetal metabolic acidosis and cerebral hypoxia (RANZCOG, 2019). The fetal heart rate can be monitored intrapartum by either structured intermittent auscultation (SIA) or by continuous electronic fetal monitoring. Continuous EFM is associated with fewer seizures for babies, without a difference in the rates of diagnosis of cerebral palsy. However, continuous EFM is also associated with increased numbers of caesarean and instrumental births, both of which carry risks for the birthing person. Continuous EFM makes moving and changing positions difficult in labour and it is not possible to use CEFM in a birthing pool without telemetry monitors, which may impact on the labouring person's coping strategies. Therefore, EFM is not recommended for routine use in the care of low-risk birthing people and babies (NICE, 2017). The recommendation to use intrapartum EFM should be based on the presence of antenatal or intrapartum risk factors.

Risk factors

Antenatal Risk Factors	Intrapartum Risk Factors
• abnormal antenatal CTG • abnormal Doppler umbilical artery velocimetry • suspected or confirmed intrauterine growth restriction • oligohydramnios (DVP < 2cm or AFI < 5cm) • polyhydramnios (DVP > 8cm or AFI > 20cm or as defined by local referral guidelines) • prolonged pregnancy ≥ 42 weeks • multiple pregnancy • breech presentation • antepartum haemorrhage • prolonged rupture of membranes (≥ 24 hours) • known fetal abnormality that requires monitoring • uterine scar (e.g. previous caesarean) • essential hypertension or pre-eclampsia • diabetes where medication is indicated, poorly controlled, or with fetal macrosomia • other current or previous obstetric or medical conditions which constitute a significant risk of fetal compromise (e.g. cholestasis, isoimmunisation, substance abuse) • fetal movements altered unless there has been demonstrated wellbeing and return to normal fetal movements • morbid obesity (BMI ≥ 40) • maternal age ≥ 42 • abnormalities of maternal serum screening associated with an increased risk of poor perinatal outcomes (e.g. low PAPP-A <0.4MoM or low PlGF) • abnormal placental cord insertion • abnormal cerebroplacental ratio	• induction of labour with prostaglandin/oxytocin • abnormal auscultation or CTG • oxytocin augmentation • regional anaesthesia (e.g. epidural* or spinal) • abnormal vaginal bleeding in labour • maternal pyrexia ≥ 38°C • meconium or blood stained liquor • absent liquor following amniotomy • prolonged first stage as defined by referral guidelines • prolonged second stage as defined by referral guidelines • pre-term labour less than 37 completed weeks • tachysystole (more than five active labour contractions in ten minutes, without fetal heart rate abnormalities) • uterine hypertonus (contractions lasting more than two minutes in duration or contractions occurring within 60 seconds of each other, without fetal heart rate abnormalities) • uterine hyperstimulation (either tachysystole or uterine hypertonus with fetal heart rate abnormalities). ***Following a decision to insert an epidural block, a CTG should be commenced to establish baseline features prior to the block's insertion.**

Consider EFM where multiple conditions from the following list are present

- pregnancy gestation 41+0 – 41+6 weeks' gestation
- gestational hypertension
- gestational diabetes mellitus without complicating factors
- obesity (BMI 30-40)
- maternal age ≥ 40 and < 42 years
- AFI 5-8cm (or DVP 2-3cm)
- maternal pyrexia ≥ 37.8°C and < 38°C

Refer Appendix 1.

Antenatal fetal heart monitoring

There is very little evidence to support either the routine antenatal use of EFM for fetal assessment in people with an uncomplicated pregnancy, or to support EFM prior to 28 weeks gestation. Any decision to perform this level of monitoring prior to 28 weeks gestation should be discussed with the obstetric SMO and the decision and rationale documented.

Use of EFM to assess fetal wellbeing between 28-37 weeks of gestation is based on clinical indication. When intrauterine fetal demise is suspected based on clinical assessment, ultrasound scan is recommended as the initial investigation in place of EFM following auscultation with a handheld Doppler. Refer to MATY115 Management of women with decreased fetal movements.

Intrapartum fetal heart monitoring

All pregnant people should be informed **antenatally**, by their LMC, about the practice of fetal heart rate monitoring in labour (RANZCOG, 2019). This discussion should occur between the pregnant person and their LMC. Where EFM is recommended in labour, the rationale should be discussed with pregnant people and informed consent gained and documented. Those who decline continuous EFM are supported with close intermittent auscultation. Their care plan should include their preferences for the type of monitoring as recommended by the professional colleges and include:

- Rationale for EFM
- Risks and benefits of different types of EFM
- General indications for continuous monitoring and indications specific to the pregnant person and pregnancy

All pregnant people should be assessed **in labour** for their suitability for SIA or EFM across the following parameters:

- Risk factors for increased fetal compromise
- Abdominal palpation to assess lie, presentation, position, descent, growth and liquor volume
- Fetal movements
- Uterine activity – frequency, length, strength, resting tone, uterine irritability and tenderness, duration of labour
- Maternal pulse – recorded to distinguish from fetal heart rate

The decision for mode of fetal monitoring will take the findings of all these assessments into account, as well as the pregnant person's preference recorded in the care plan (Maude, Skinner & Foureur, 2014; RANZCOG, 2019)

Low risk pregnant people who have an admission CTG are more likely to have a caesarean birth than those allocated to intermittent auscultation, with no improvement in neonatal outcomes. As such, people in spontaneous labour with uncomplicated pregnancies and labour process should be recommended to have intermittent auscultation (NICE, 2017).

Structured intermittent auscultation procedure

Intermittent auscultation is a listening and counting method and the fetal heart rate should be determined as a single number (as for pulse rate) instead of a range.

Intermittent auscultation may be undertaken with pinard, fetal stethoscope or hand-held Doppler monitor. The latter is recommended during labour due to greater accuracy (Martis, Emilia, Nurdiati & Brown, 2017), reduced impact on the labouring person's mobility and position, and the ability of they and their support people to hear the fetal heart sounds.

First stage of labour

- Assess every 15-30 minutes
- Commence counting toward the end of a contraction
- 30-60 seconds duration
- Palpate maternal heart rate at least hourly to differentiate from fetal heart

Second stage of labour

- Frequency after each contraction and at least every 5 minutes
- Counting from the end of a contraction
- 30-60 seconds duration

Interpretation and documentation

The terminology used around SIA is different from that used for CTGs as there is not a printed trace to interpret.

- **Fetal heart rate** – determined by listening, in the absence of fetal movements, and counting for 30-60 seconds.
- **Fetal heart rate increases** – determined by listening during a fetal movement
- **Fetal heart rate decreases** – these should not be audible when auscultation is performed immediately after a contraction for 60 seconds in first stage

Each instance of SIA should be documented with the fetal heart rate, any increases or decreases, and any irregularity noted, as well as a plan for increased frequency or EFM where findings are abnormal.

The method, timing and duration of auscultation should be documented at least once when SIA is commenced.

Normal findings

- Fetal heart rate between 110-160 bpm
- Fetal heart increases above the average
- No fetal heart decreases below the average
- Regular rhythm

Abnormal findings

- Tachycardia (> 160 bpm)
- Bradycardia (< 110 bpm)
- Gradual or abrupt decreases in fetal heart rate
- Changes to rhythm (irregular)

Electronic fetal monitoring procedure

The procedure for commencing a CTG trace is consistent regardless of gestation and stage of pregnancy or labour.

- Explain clinical rationale and procedure for EFM to the pregnant person, and gain verbal consent
- Ensure they are comfortable and have had an opportunity for toileting
- Apply universal precautions
- Complete an abdominal palpation if not already done prior to decision for EFM, and place the cardiograph and tocograph transducers according to palpation findings, adjusting for maternal and fetal position changes and descent.
- Observe and document maternal vital signs on the trace
- Ensure CTG trace is printing and check time and date settings and FHR offsets are correct
- Ensure the pregnant person is not left unattended for >20mins while undergoing a CTG, and is aware and able to call staff if the CTG machine alarms
- Document the person's name, gestation, reason for CTG, all vital signs and abdominal palpation findings on CTG trace.

- Encourage and help the person to be mobile and change position as often as they wish

For continuous EFM to have value, uterine activity and FHR trace must be clearly recorded with minimal loss of contact or interruption.

Where continuous EFM is required for a substantial period, and if the EFM to date is considered normal, monitoring may be interrupted for short periods of up to 15 minutes to allow for personal care (e.g. toilet or shower). Such interruptions should be infrequent and not occur following any intervention that might be expected to alter the fetal heart rate (e.g. medication administration, rupture of membranes). **When fetal compromise is suspected or the CTG is abnormal, EFM should not be discontinued without senior clinical review** (RANZCOG, 2019).

Monitor the fetal heart rate by intermittent auscultation during unavoidable interruptions. Interruptions to fetal monitoring should be minimised during transfer to the operating theatre and prior to delivery of the fetus, especially in the context of suspected fetal compromise (RANZCOG, 2019).

Interpretation

- Intrapartum fetal surveillance and its interpretation is a complex task that requires a sound understanding of fetal physiological responses to hypoxia, good pattern recognition skills and the ability to integrate this knowledge with each clinical situation. The summary of fetal heart rate patterns provided below is to be used in addition to, rather than instead of, an understanding of fundamental physiology. All intrapartum CTG traces should be interpreted and documented in line with RANZCOG guidance.

The normal antenatal OR labour CTG is associated with a low probability of fetal compromise and has the following features:

- Baseline rate 110-160 bpm
- Baseline variability of 6-25 bpm
- Accelerations 15 bpm for 15 seconds (accelerations in the preterm fetus may be of lesser amplitude and shorter duration)
- No decelerations

All other CTGs are by this definition *abnormal* and require further evaluation taking into account the full clinical picture.

The following features are abnormal but unlikely to be associated with significant compromise when occurring in isolation:

- Baseline rate 100-109 bpm in a term fetus
- Reduced baseline variability 3-5 bpm lasting less than 40 minutes
- Absence of accelerations
- Early decelerations

- Variable decelerations without complicating features

Continuation of these features greater than 40 minutes in duration warrants review by a senior clinician.

The following features are abnormal and may be associated with significant fetal compromise and require further action including consultation with obstetrics per Section 88 Referral Guidelines:

- Baseline fetal tachycardia > 160 bpm
- Rising baseline FHR (including when in the normal range)
- Baseline variability of 3-5bpm lasting longer than 40 minutes
- Absence of accelerations in an antenatal trace lasting longer than 40 minutes
- Complicated variable decelerations
- Late decelerations
- Prolonged decelerations

The following features are abnormal and are likely to be associated with significant fetal compromise and require immediate action, which may include urgent delivery:

- Bradycardia (a fall in the baseline fetal heart rate for >5 mins)
- Absent baseline variability <3bpm
- Sinusoidal pattern
- Complicated variable deceleration with reduced or absent baseline variability
- Late decelerations with reduced or absent baseline variability

Interpretation of antenatal EFM is the same as intrapartum with the following added considerations:

- All abnormalities on an antenatal CTG trace require senior obstetric or senior midwifery review.
- The automatic fetal movement detector is not a reliable method for detecting genuine fetal movement as it can be triggered by low velocity movement; it is recommended the hand held event marker is used by the pregnant person to clearly determine fetal movements.

Documentation

All CTG traces should have the following information documented on the trace:

- Maternal pulse / continuous heart rate monitoring
- Significant events, especially those that may affect the fetal heartrate (e.g., vaginal examinations, insertion of epidural, episodes of vomiting or hypotension, fetal blood sampling.)

- Maternal pulse whenever there is a break in recording or if there is a sudden change in baseline rate. Use continuous maternal pulse rate monitoring where available
- Signature of any member of staff who is asked to provide an opinion along with the date, time and signature.

A documented systematic assessment must be undertaken at least every hour. It is recommended that a CTG sticker (refer Appendix 2) is used by midwifery and obstetric staff to document CTGs in the clinical record. Where CTG stickers are not available for use, the following features must be documented at least hourly:

- Baseline fetal HR
- Baseline variability
- Presence/Absence of accelerations
- Presence/Absence and type of decelerations, with additional information as to the amplitude and duration
- Frequency and intensity of uterine activity
- Overall interpretation using RANZCOG terminology

CTG traces should be checked by another clinician ("second eyes") every two hours, or when significant changes occur.

Complete the CTG sticker tool prior to requesting a review by the senior midwife, or obstetric staff. All CTG reviews must be documented by the reviewer, in the notes or on the sticker, as well as being signed on the trace.

Following discontinuation of EFM, sign the CTG paper and if in labour, note the date, time and mode of birth. Number all CTGs in chronological order and store in cardboard CTG pocket with the person's clinical record.

Uterine activity monitoring and interpretation

Uterine activity monitoring is a critical to the interpretation of fetal heart monitoring.

Where a clear recording of uterine contractions on a CTG cannot be obtained despite adjusting the tocograph, contractions must be recorded manually on the CTG itself. This is achieved by using the **fetal movement button to record the start and the end of the contraction and then drawing a bracket between the two markers** on the CTG paper.

NB. Marking the CTG paper with a pen at the time of the contraction will result in inaccurate recording, due to a time lag in paper feeding out of the machine.

Excessive Uterine Activity

In the absence of fetal heart rate abnormalities, excessive uterine activity is defined as either:

- **Tachysystole** – more than five active labour contractions in ten minutes, without fetal heart rate abnormalities, or
- **Uterine Hypertonus** – contractions lasting more than two minutes in duration or contractions occurring within 60 seconds of each other

Appropriate management of uterine hypertonus or tachysystole includes:

- Continuous electronic fetal monitoring
- Consideration of the need to reduce or cease oxytocin infusion
- One to one uninterrupted care of the labouring person until normal uterine activity is observed
- Consideration of tocolysis

Excessive uterine activity in the presence of fetal heart rate abnormalities is defined as **uterine hyperstimulation**, and appropriate management includes:

- Continuous electronic fetal monitoring;
- Reduction or cessation of oxytocin infusion;
- One to one uninterrupted care of the labouring person until normal uterine activity is observed
- Consideration of tocolysis (see MATY071 Uterine Hyperstimulation Policy)
- Consideration of urgent delivery

Management of abnormal heart rate

Identification and management of reversible abnormalities may prevent unnecessary intervention. Where the fetal heart rate is considered abnormal, whichever fetal monitoring method is used, appropriate actions include:

- Continuing / commencing EFM, avoiding interruption to the trace
- Escalation to a senior midwife in the first instance; if abnormalities persist, or are consistent with significant fetal compromise, obstetric staff should be notified immediately.
- Checking maternal pulse / attaching maternal probe if not recorded by tocometer. NB., it is unusual to have accelerations with contractions in the second stage of labour, and suggests that the maternal heart rate is being recorded.
- Consideration of fetal scalp electrode where there is significant loss of contact or difficulty distinguishing maternal and fetal heart rate and where membranes have already ruptured or rupture of membranes is feasible and appropriate. Consider contraindications for FSE.
- Identification of reversible causes (e.g. hypotension, hyperstimulation) and initiation of intrauterine resuscitation (**SPLIT** acronym):

S	**S**top the oxytocin if hypoxia is likely
P	**P**osition the labouring person on their left side to increase utero-placental perfusion and/or alleviate cord compression
L	**L**ow blood pressure correction
I	**I**ntravenous fluids - rapid infusion
T	**T**ocolysis with terbutaline 250mcg (See MATY071 Uterine Hyperstimulation Policy)

- Use of "open glottis pushing" during the second stage of labour. NB., the Valsalva manoeuvre has been shown to increase fetal hypoxia.
- Consideration of fetal blood sampling (See MATY093 Fetal Blood Sampling and Cord Blood Lactate Test Using Nova Statstrip™ Lactate Meter Policy) Consider contraindications as for FBS.
- Expedited birth where there is clear evidence of sustained fetal compromise or CTG abnormalities are of a degree requiring further assessment, but FBS is contraindicated, clinically inappropriate or not feasible, or where the decision to delivery interval may be prolonged. Tocolysis should be given when a decision for caesarean birth is made in the presence of fetal heart rate abnormalities.
- Paired (arterial and venous) cord blood gas following birth, where there has been concern about the fetal heart rate in labour

Fetal Scalp Electrode Monitoring

The use of a fetal scalp electrode (FSE) is indicated when there is significant loss of contact with an abdominal trace which cannot be rectified with palpation and repositioning of transducer. It must be discussed with the labouring person.

Contraindications to FSE include:

- Known maternal infection, e.g. HIV, hepatitis B&C viruses, active herpes simplex virus or evidence of intrauterine sepsis. Group B Streptococcus carrier status does not preclude FSE
- History of genital herpes – avoid FSE if possible unless benefits outweigh risks
- Prematurity < 34 weeks unless the following apply (NICE, 2015):
- it is not possible to monitor the fetal heart rate using either external cardiotocography or intermittent auscultation
- it has been discussed with a senior obstetrician
- the benefits are likely to outweigh the potential risks
- the alternatives (immediate birth, intermittent ultrasound and no monitoring) have been discussed with the labouring person and are unacceptable to them
- Face, brow or uncertain presentation

- Bleeding disorder such as suspected fetal thrombocytopenia, haemophilia or known maternal autoimmune thrombocytopenia.

Fetal Blood Sampling

- Units employing electronic fetal monitoring are strongly encouraged to have access to fetal blood sampling facilities to assist in management of labours where the fetus is demonstrating heart rate abnormalities.
- See MATY093 Fetal Blood Sampling and Cord Blood Lactate Test Using Nova Statstrip™ Lactate Meter Policy for guidance on fetal blood sampling in the presence of fetal heart abnormalities.

Education and Training

This guideline is accompanied by a comprehensive and ongoing education and training programme.

Fetal monitoring training is mandatory for all Te Whatu Ora Capital, Coast and Hutt Valley employed health professionals undertaking any aspect of EFM, and those with access agreements with the Facility

Te Whatu Ora Capital, Coast and Hutt Valley maternity staff and access agreement holders are required to complete:

- RANZCOG Fetal Surveillance Education Programme (FSEP) full day workshop **once every 2 years**
- *Either* RANZCOG FSEP 4 hour Refresher
- *Or* RANZCOG Online Fetal Surveillance Education Programme (OFSEP) **every other year**

References:

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- NICE (2019) Antenatal care for uncomplicated pregnancies: Clinical guideline [CG62]
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- NZCOM (2018). NZCOM Choose Wisely. Choosing Wisely Campaign.
- RANZCOG (2019) Intrapartum fetal surveillance: Clinical guideline - Fourth edition.

Related Documents:

Document type	Action
Guideline / policies	MATY115 Management of women with decreased fetal movements MATY093 Fetal Blood Sampling and Cord Blood Lactate Test Using Nova StatstripTM Lactate Meter Policy MATY071 Uterine Hyperstimulation Policy
Professional body guidelines	RANZCOG (2019). Intrapartum Fetal Surveillance Clinical Guideline (4th ed.)

Keywords for searching:

1. Fetal monitoring
2. Fetal heart rate
3. CTG
4. Intrapartum

Informed Consent:

The right of a consumer to make an informed choice and give informed consent, including the right to refuse medical treatment, is enshrined in law and in the Code of Health and Disability Consumers' Rights in New Zealand. This means that a woman can choose to decline treatment, referral to another practitioner, or transfer of clinical responsibility. If this occurs follow the process map on page 18 of the Referral Guidelines (Ministry of Health, 2012).

Tangata Whenua Statement:

The Women's Health Service recognises the rights and responsibilities of Māori as tangata whenua and Treaty Partners. This allows and acknowledges the importance of cultural diversity in all aspects of our care and practice in Aotearoa New Zealand.

As stated in Te Pae Amorangi (Hutt Valley Māori Health Strategy) 2018-2027, Te Whatu Ora Capital, Coast and Hutt Valley as a Crown agency is committed to our role in maintaining active relationships with iwi, under Te Tiriti o Waitangi. This strategy recognises the established principles of Partnership, Participation and Protection and recognises steps towards the reviewed interpretation of Te Tiriti principles to date (from the Wai 2575 claim into health). These are tino rangatiratanga, equity, active protection, partnership and options.

Attention in particular is drawn to:

- **Article one – Kāwanatanga**: actively engaging and working alongside with local iwi through the Hutt Valley Māori Health Unit
- **Article two – Tino Rangatiratanga**: Self-autonomy, self-determination; the responsibility to enable Māori to exercise their authority over their own health, determinants and definition of health
- **Article three – Ōritetanga**: equal health outcomes of peoples; ensuring that policy, guidelines or programmes do not further perpetuate any inequity
- **Article four (the 'oral clause') – Wairuatanga**: spirituality; thriving as Māori and the importance of health providers understanding health in te ao Māori (the Māori world), acknowledging the interconnectedness and inter-relationship of all living and non-living things.